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| 09/974,566 | 10/10/2001 | Joseph J. Crisco III | P00493-US1 | 8298 |

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|---|---|
| LE, TOAN M | |
| **ART UNIT** | **PAPER NUMBER** |
| 2863 | |

DATE MAILED: 12/15/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

| Office Action Summary | Application No. | Applicant(s) | |
|---|---|---|---|
| | 09/974,566 | CRISCO ET AL. | |
| | Examiner | Art Unit | |
| | Toan M Le | 2863 | |

*-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --*

**Period for Reply**

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

**Status**

1)☒ Responsive to communication(s) filed on 10 July 2003 .

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

**Disposition of Claims**

4)☒ Claim(s) 1-22 is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) 1-22 is/are rejected.

7)☐ Claim(s) _____ is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

**Application Papers**

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

11)☐ The proposed drawing correction filed on _____ is: a)☐ approved b)☐ disapproved by the Examiner.

If approved, corrected drawings are required in reply to this Office action.

12)☐ The oath or declaration is objected to by the Examiner.

**Priority under 35 U.S.C. §§ 119 and 120**

13)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____ .

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

14)☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).

a) ☐ The translation of the foreign language provisional application has been received.

15)☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

**Attachment(s)**

1) ☐ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s) _____ .
4) ☐ Interview Summary (PTO-413) Paper No(s). _____ .
5) ☐ Notice of Informal Patent Application (PTO-152)
6) ☐ Other: .

## DETAILED ACTION

### *Response to Amendment*

### *Claim Rejections - 35 USC § 102*

The following is a quotation of the appropriate paragraphs of 35 U.S.C. 102 that form the basis for the rejections under this section made in this Office action:

> A person shall be entitled to a patent unless –
>
> (b) the invention was patented or described in a printed publication in this or a foreign country or in public use or on sale in this country, more than one year prior to the date of application for patent in the United States.

Claims 1-14 and 22 are rejected under 35 U.S.C. 102(b) as being anticipated by Stewart et al..

Referring to claim 1, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, comprising: a plurality of sensing devices constructed and arranged orthogonal to the outer surface of the body part to respectively detect acceleration in a corresponding plurality of directions which are each orthogonal to the outer surface of the body part (figures 4A-4C); the plurality of sensing devices being constructed and arranged to generate a signal in response to a sensed acceleration in each of the corresponding plurality of directions (col. 14, lines 21-42 and 52-54; figures 4A-4C); a processing device connected to the plurality of sensing devices and being constructed and arranged to receive signals from the plurality of sensing devices and determine the magnitude and direction of an impact to the body part in the plurality of directions which are each orthogonal to the outer surface of the outer surface of the body part (col. 4, lines 28-31; and col. 14, lines 53-58; figures 4A-4C).

As to claim 2, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the plurality of sensing devices are single-axis linear accelerators (col. 15, lines 63-67).

Referring to claim 3, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the plurality of sensing devices are multi-axis linear accelerators with at least one axis thereof being orthogonal to the outer surface of the body part (col. 7, lines 34-35; and col. 14, lines 21-42).

As to claim 4, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, further comprises: a protective layer of material positioned about the body part; a plurality of portions of cushioning material disposed between the body part and the protective layer of material (col. 17, line 19; figure 2A).

Referring to claims 5-7, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, further comprising: a carrier web being closely fitted around the body part; the plurality of sensing devices being attached to the carrier web and positioned orthogonal and proximal to the outer surface of the body part to respectively sense acceleration in directions which are each orthogonal to the outer surface of the body part (figures 4A-4C); and a plurality of carrier clips positioned between the plurality of portions of cushioning material; the carrier clips respectively carrying the plurality of sensing devices and being positioned orthogonal and proximal to the outer surface of the body part to respectively sense acceleration in directions which are each orthogonal to the outer surface of the body part (figures 4A-4C); and wherein the plurality of sensing devices are embedded within the plurality of portions of cushioning material and are positioned orthogonal and proximal to the outer surface of the body

part to respectively sense acceleration in directions which are each orthogonal to the outer surface of the body part (col. 6, lines 21-24; and col. 17, lines 21-23; figures 4A-4C and 5).

As to claim 8, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the plurality of sensing devices are three devices positioned 120 degrees apart from one another about the circumference of the body part (figure 5).

Referring to claim 9, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, further comprising a recording station 52 (figures 1 and 2A-2B) connected to the plurality of sensing devices (col. 5, lines 54-62).

As to claim 10, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the recording station is connected to the plurality of sensing devices by wire (col. 14, lines 45-47).

Referring to claim 11, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the recording station is connected to the plurality of sensing devices by radio transmission (col. 14, lines 57-58).

As to claim 12, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the body part is a head (figure 2A).

Referring to claim 13, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the plurality of sensing devices are mounted in a helmet (figure 2A).

As to claim 14, Stewart et al. disclose a device for monitoring the acceleration of a body part having an outer surface, wherein the plurality of sensing devices are mounted in a head band (col. 5, lines 12-17).

Referring to claim 22, Stewart et al. disclose a method of acceleration monitoring, comprising the steps of: attaching an acceleration-monitoring technology devices, having acceleration sensors, to an individual such that the acceleration sensors remain fixed relative to a body part of the individual during physical activity where the body part has an outer surface (col. 14, lines 21-26); measuring accelerations of the body part of the individual during physical activity along at least a first, a second and a third acceleration measurement direction, wherein the first acceleration measurement direction is orthogonal to the outer surface of the body part , and the second acceleration measurement direction is orthogonal to the outer surface of the body part, and the third acceleration measurement direction is orthogonal to the outer surface of the body part (col. 14, lines 27-42); storing the accelerations of the body part of the individual in each of the first, second and third acceleration measurement directions which are each orthogonal to the outer surface of the body part (figures 4A-4C) during the physical activity as acceleration data in a mass storage device; retrieving the acceleration data of the body part of the individual during physical activity (col. 14, lines 60-64); determining a direction and magnitude of the impact to the body part of the individual during the physical activity and the rotational acceleration of the body part of the individual during the physical activity from the acceleration data (col. 14, lines 53-55).

## *Claim Rejections - 35 USC § 103*

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at

> the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

Claims 15-21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Stewart et al. in view of Vogt.

Referring to claims 15-21, Stewart et al. disclose a method for determining the magnitude and direction of impact to a body part having a geometric shape, comprising the steps of: positioning a plurality of accelerometers proximate to the outer surface of a body part in a defined arrangement about the surface of the body part (col. 14, lines 21-42); orienting the plurality of accelerometers to sense respective linear acceleration in respective directions which are each orthogonal to the outer surface of the body part (col. 15, lines 63-67; figures 4A-4C); recording acceleration data sensed by the plurality of accelerometers in the directions which are each orthogonal to the outer surface of the body part (col. 14, lines 57-58; figures 4A-4C).

Stewart et al. do not disclose a method for determining the magnitude and direction of impact to a body part having a geometric shape comprising the steps of: providing a hit profile function from the geometric shape of the body part and the positioning of the plurality of accelerometers thereabout to respectively sense acceleration in directions which are orthogonal to the outer surface of the body part; generating a plurality of potential hit results from the hit profile function; comparing the plurality of potential hit results to the acceleration data sensed by the plurality of accelerometers; best fit matching one of the potential hit results to the acceleration data to determine a best fit hit results; and determining the magnitude of linear acceleration, in each of the directions which are orthogonal to the outer surface of the body part, and the direction of an impact to the body part from the best fit hit result.

Vogt disclose a method for sensor signal prediction comprising the steps of: providing a profile function; generating a plurality of potential results from the profile function (col. 3, lines 28-46; col. 6, lines 40-45 and 57-62; figure 1); comparing the plurality of potential results to the sensed data; best fit matching one of the potential results to the sensed data to determine a best fit using least-square regression model (col. 4, lines 14-17; and col. 6, lines 46-55; figures 3-6).

Vogt does not teach a hit profile function of the geometric shape of the body part approximate to a circle and the positioning of the plurality of accelerometers thereabout, wherein the hit profile function is equal to a* cos(s-b) + c where a is the impact magnitude, s is the arc defining the accelerometer position, b is the impact direction and c is the radial acceleration due to pure rotation about the Z-axis to determine the magnitude of linear acceleration, in each of the directions which are orthogonal to the outer surface of the body part, and the direction of an impact to the body part from the best fit hit results and estimating the rotational acceleration of the body part from the magnitude of linear acceleration in each of the directions which are orthogonal to the outer surface of the body part and the location of the impact to the body part from the best fit hit result by multiplying the distance from the location of the impact to an axis of rotation of the body part by the magnitude of the linear acceleration of the body part.

However, it would have been obvious to one having ordinary skill in the art at the time the invention was made to have applied the method of Vogt using a sinusoidal function a* cos(s-b) + c where a is the impact magnitude, s is the arc defining the accelerometer position, b is the impact direction and c is the radial acceleration due to pure rotation about the Z-axis to determine the magnitude of linear acceleration, in each of the directions which are orthogonal to the outer surface of the body part, and the direction of an impact to the body part from the best fit

hit results and estimating the rotational acceleration of the body part from the magnitude of linear acceleration in each of the directions which are orthogonal to the outer surface of the body part and the location of the impact to the body part from the best fit hit result by multiplying the distance from the location of the impact to an axis of rotation of the body part by the magnitude of the linear acceleration of the body part into the method of Stewart et al. for simulating the magnitude and direction of impact to a body part comprising a plurality of accelerometers in a defined arrangement about the surface of the body part in a real time to provide specific data as to actual human injuries during physical activity.

**Remarks**:

***Response to Arguments***

Applicant's arguments filed 7/10/03 have been fully considered but they are not persuasive.

Referring to claim 1, Applicant argues that "However, Stewart teaches a device and method which is completely different than Applicants' claimed invention, as amended. Stewart discloses a system that employs a fundamentally different methodology for determining the direction of an impact to a body part. First, in similar fashion to Applicants' invention, Stewart employs an array of accelerometers which are disposed proximate to the outer surface of a body part. Further, Stewart's accelerometers generate signals which are later processed to determine the direction and magnitude of the impact to the body part. However, the orientation of the accelerometers in Stewart is completely different than in Applicants' invention. The heart of Stewart's invention is to arrange each of the accelerometers orthogonal to each other. In contrast to what is stated in the office action, Stewart's accelerometers are not disposed orthogonal to the

outer surface of a body part, as required in Applicants' invention, or to any surface for that matter. In fact, Stewart requires that each of its accelerometers be positioned to sense acceleration in directions which are orthogonal to each other. Stewart merely requires that the accelerometers be positioned proximal to the body part. However, Stewart is completely devoid of any teaching that calls for orientating the accelerometers relative to the body part. It is this orientation of the accelerometers relative to the outer surface of the body part that is unique to Applicants' invention."

Stewart discloses a device for monitoring the acceleration of a body part having an outer surface comprising a plurality of sensing devices constructed and arranged orthogonal to each others and to the outer surface of the body part to respectively detect acceleration in a corresponding plurality of the directions which are each orthogonal to the outer surface of the body part (figures 2A-2B, 4A-4C, and 5).

As to claims 5-7, Applicant argues that "In that connection, carrier clips and the embedding of the sensing devices to sense acceleration in direction which are orthogonal to the outer surface of a body part are also not taught in Stewart."

Stewart discloses "It was also important that the electronic components used in the HAT be small enough to be contained inside the helmet without significant change to the structure and function of the conventional helmet." (col. 6, lines 21-24)

Stewart further discloses "a helmet that defines a pouch in a back portion of said helmet constructed and arranged to hold a system unit during data collection periods." (col. 17, lines 21-23)

Referring to claim 8, Stewart disclose the plurality of sensing devices are three devices positioned 120 degrees apart from one another about the circumference of the body part in figure 5.

As to claim 22, Applicant argues that "Further to the details comments made in connection with Claim 1 above, Stewart, in fact, teaches a first and second acceleration directions which are orthogonal to each other and a third acceleration direction which is orthogonal to a plane formed by the first and second acceleration directions. Stewart has no teaching whatsoever of the acceleration directions being orthogonal to an outer surface of a body part."

Stewart teaches acceleration directions being orthogonal to an outer surface of a body part (figures 4A-4C).

Referring to claims 15-21, Applicant argues that "Stewart teaches a model and methodology to determine the magnitude and direction of an impact by positioning accelerometers orthogonal to one another. As a result, the positioning of accelerometers relative to the outer surface of a body part in Stewart is completely irrelevant. Vogt merely teaches using a profile for predictive output based on sensor input. However, Vogt is devoid of any disclosure that concerns the direction and magnitude of an impact to a body part or the use of a geometric shape to approximate the body part itself. Thus, Stewart has no desire at all to use any type of hit profile function that corresponds to the geometric shape of a body part. There is no suggestion or teaching in Stewart to employ such a hit profile function nor is there such a teaching in Vogt to support the combination suggested in the office action. In fact, Stewart teaches away from using a hit profile function due to the use of accelerometers which are positioned orthogonal to

each other. Even if Stewart and Vogt were combinable under Section 103, the resultant combined teaching still claearly fails to teach Applicants' claimed invention in Claims 15-21, as amended. Applicants' invention employs a new, novel and unobvious method of sensing acceleration in directions which are orthogonal to the outer surface of the body part. "

Stewart teaches positioning of accelerometers orthogonal to one another and to the outer surface of a body part (figures 2A-2B, 4A-4C, and 5).

***Conclusion***

**THIS ACTION IS MADE FINAL.**

Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Toan M Le whose telephone number is (703) 305-4016. The examiner can normally be reached on Monday through Friday from 9:00 A.M. to 5:30 P.M..

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, John Barlow can be reached on (703) 308-3126. The fax phone numbers for the

organization where this application or proceeding is assigned are (703) 872-9306 for regular communications and (703) 872-9306 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 305-4900.

Toan Le

December 9, 2003

John Barlow
Supervisory Patent Examiner
Technology Center 2800